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(19) (CA) **CANADIAN PATENT** (12)

(54) COFFEE MACHINE

(72) Illy, Ernesto,
Italy

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Canada

1 ABSTRACT OF THE DISCLOSURE

5 An espresso machine has a coffee brewing
chamber, a water reservoir and a water heater.
Two electrical pumps are provided, one capable of
supplying a smaller quantity of water from the
reservoir via the heater to the brewing chamber
so as to make a regular-strength coffee beverage,
and the other capable of supplying a considerably
larger quantity of water from the reservoir via
the heater to the brewing chamber, so as to make a
weaker-strength coffee beverage from an identical
quantity of coffee. A selector at the outside of
the machine
the ~~pump~~ allows a user to select which one of the
pumps he wishes to energize.
10

1 "Coffee Machine"

BACKGROUND OF THE INVENTION

5 The present invention relates to a coffee machine in general, and to an electric coffee machine in particular.

Still more specifically, the invention relates to an espresso coffee machine for brewing coffee from coffee pods.

10 Coffee machines are already known which brew coffee from coffee pods by passing hot water through a coffee-containing pod located in a brewing or extraction chamber. Such machines are valued for the reliable reproducibility of their brewing results.

15 It is also known that there are coffee machines which supply cups of coffee of constant volume (and hence strength) and others which, on demand, supply cups of coffee of different volumes (and hence strengths) by varying the

1 quantity of water which is made to pass through
a coffee pod, or by using filters of different
characteristics.

5 Let it be assumed, for purposes of the ex-
planations hereafter, that the term "standard
coffee" (i.e. coffee beverage of "standard" strength)
refers to an espresso coffee beverage made by passing
about 40 cc of hot water through a predetermined
quantity of ground or powdered coffee beans in
10 e.g. a pod. Let it further be assumed that the term
"weak coffee" refers to an espresso coffee beverage
made by passing a substantially higher quantity
of hot water, about 120 cc, through an identical
quantity of ground or powdered coffee beans. Of
15 course, these quantities and the relationship be-
tween them are arbitrary and intended only to facili-
tate explanations.

20 The prior-art variable-volume coffee machines
have several decided disadvantages. Chief among
these are the fact that the beverage which results
when the water volume is changed, will vary not only
in quantity but also in taste and appearance (the
creamy, foamy appearance of typical espresso), and
also that brewing of a "weak" coffee requires a

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preparation time which is much longer (as much as 3-4 times longer) than the time required for preparation of the "standard" coffee.

SUMMARY OF THE INVENTION

1 It is an object of the present invention to overcome the disadvantages of the prior art.

5 More specifically, it is an important object of the invention disclosed herein to provide a novel coffee machine which assures that the preparation period is substantially the same, whether "standard" or "weak" coffee is being brewed.

10 Another, no less important object of the invention is to provide such a novel coffee machine which assures that the taste (although not the strength) of the coffee beverage and its creamy, foamy appearance, remain the same irrespective of whether a "standard" or a "weak" coffee is being brewed.

15 Pursuant to the above objects, and still others which will become apparent as the description proceeds, one aspect of the invention resides in a coffee machine which, briefly stated, may comprise means defining a brewing chamber having an outlet for brewed coffee and being adapted to receive pods of coffee; a water reservoir; means for heating water operatively connected with the brewing chamber;

20

1 first pump means connected with the reservoir and heating
means for forwarding, when energized, a first quantity
of water from the reservoir to the heating means and a
corresponding quantity of heated water from the heating
5 means to the brewing chamber; second pump means also
connected with the reservoir and heating means for forwarding, when energized, a second larger quantity of
water from the reservoir to the heating means and a
corresponding quantity of heated water from the heating
10 means to the brewing chamber and control means for
selectively energizing one of the first and second pump
means.

It should be understood that as a result of
experimentation made by the inventor the novel espresso
15 coffee machine is provided with two different pumps, a
rotary pump and a reciprocating pump, able to work
alternatively for pumping conveniently heated water
through a coffee pod; it was found that a convenient rotary pump delivering a standard coffee in a normally
20 accepted time period may be associated in the machine with
a certain convenient reciprocating pump that delivers
a weak coffee in a time period not much longer than the
rotary one, the latter coffee so having a taste and an
appearance still equal to those of standard coffee.

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1 The invention will hereafter be described
with reference to an exemplary embodiment, as illustrated
in the appended drawings. It is to be understood, however,
that this is for purposes of explanation of the invention
5 only, and is not to be considered as implying any li-
mitations whatsoever.

BRIEF DESCRIPTION OF THE DRAWING

The single Figure is a diagrammatic illustration
of a coffee machine embodying the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

1 The machine illustrated in the Figure brews
each beverage to be dispensed, from a fresh coffee pod 1.
Such pods are known from the prior art, for example from
5 U.S. allowed application Serial Number 033,815, and are
essentially small quantities of powdered or granulated
coffee bean material, which may be compressed and is
contained in a water-permeable cover. In the present
instance this cover is a tape 2 of filter cloth, filter
10 paper or the like, in which the pods 1 are incorporated
at identical intervals. A supply container 6 for fresh
pods 1' and a container 7 for used pods 1'' are pro-
vided. The tape is placed over polygonal drums 4, 5
which turn about axes normal to the plane of the Figure,
15 so that the pods 1' are sequentially pulled out of
the container 6, introduced (as pods 1) into brewing
chamber 3a of brewing element 3, and then deposited as
used pods 1'' in the container 7. In container 6 the tape
may be stored by rolling up, zig-zag folding, or in any
20 other manner. One or both of the drums 4, 5 may be driven;
the drive itself is known per se.

A water reservoir 11 contains a supply of
water and is connected with a water heater 8 via two
conduit branches. One of these is composed of conduits

1 14, 15 and 19; the other of conduits 17, 18 and 19.
Interposed in the conduits 14, 15 is a first pump 12
which is in form of a rotary pump, for example of the
type commercially available under the tradename "Procon"
5 from Standex International GmbH in Krefeld, Federal
Republic of Germany. Interposed in the conduit 18 is
a second pump 13 which is, however, a reciprocating
pump, for example of the plunger type available commercially under the tradename "Turmix" from Turmix A.G.
10 of Rapperswill-Jona, Switzerland. Each of the pumps 12,
13 is connected with and has its length of operation
controlled by, a multi-cam timer T (known per se).
A solenoid valve 16 is interposed in conduit 15 downstream of the pump 12. Conduit 19 is connected with
15 the water heater 8; an outlet conduit 9, in which a
solenoid valve 10 is interposed, connects the water
heater 8 with the brewing chamber 3a. Water is heated
in water heater 8 by a not-illustrated (known-per-se)
electric resistance heating element; the internal temperature and pressure in the water heater 8 are controlled by a thermostat and valve (not shown), both
20 known per se.

The brewing element 3 is provided with an
outlet 21 for brewed coffee beverage originating in
25 the brewing chamber 3a. A user places a cup or other

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receptacle/beneath this outlet 21 before operating the machine.

5 A lever 22 provided with a handle is mounted on a switch 23 so as to be accessible at the exterior of the machine. Lever 22 can be moved between a neutral position 0 in which the machine is shut off, a position N into which it is placed when "normal" coffee is to be brewed, and a position W into which it is placed when "weak" coffee is desired. When in position N, lever 22
10 closes an electrical circuit between a current-supply line C and the internal electric line which feeds the pump 12, thereby actuating the pump 12 through the multi-cam timer. In position W the lever 22 closes the circuit between the line C and line CL which feeds pump
15 13, thus actuating the latter pump.

In operation, and assuming that the machine is ready to work, that a fresh pod 1 is located in chamber 3a, and that a user desires to obtain "normal" coffee, the user places the lever into the position N. This causes solenoid valves 10 and 16 to open (their electrical connections for this purpose are also known
20 per se and hence not shown) and the pump 12 to be energized. The pump 12 now pumps nearly 40 cc of water from reservoir 11 into the water heater 8; at the same time,

1 an equal quantity of the already hot water contained
therein is displaced out of the water heater 8 and
forwarded via conduit 9 into the brewing chamber
3a. The working period of pump 12 is controlled by
5 timer T which shuts the pump down when 40 cc (or
nearly 40 cc) of water have been pumped and valves
10, 16 close. The hot water passes through pod 1
and brews "normal" strength coffee which runs off
through outlet 21.

10 At the end of the cycle, when the pump 12
stops and the solenoid valves 10, 16 close again,
the spring-loaded lever 22 returns to the neutral
position 0, and the drums 4, 5 turn to transport
the used pod 1 out of chamber 3a and a fresh pod 1'
15 into the chamber.

By this time the new (cold) water pumped
into the water heater 8 by pump 12 has already been
heated to the correct temperature, since the heating
element is so dimensioned as to require only seconds
20 for this

1 purpose. If, now, another user comes along who prefers
"weak" coffee, he can move the lever 22 to the position
W. The previous cycle is then repeated, but with the
5 difference that the solenoid valve 16 remains closed
and that it is the pump 13 which is energized, rather
than the pump 12. Pump 13 pumps nearly 120 cc of water
from reservoir 11 into heater 8, and displaces the
same quantity of hot water from heater 8 via conduit
9 into the chamber 3a. Again, the working time of
10 pump 13 is controlled by its associated timer.

The time required for passing the nearly
120 cc of hot water through the pod 1 in chamber 3a,
to brew a "weak" coffee beverage, is about 4.5 seconds.
This is only a few seconds longer than the time re-
15 quired to brew the "normal" beverage, so that the
pronounced time differential in brewing the different -
strength beverages is avoided. Moreover, the taste
(but not the strength) of the weaker coffee, and its
appearance, are the same as for the "normal" beverage,
20 so that the machine according to the invention assures
one and the same piece of equipment is capable of
dispensing "normal" and "weak" coffee brews of the
same taste and appearance and in essentially the same
time periods.

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The invention has been described with reference
to a specific embodiment in an espresso machine.

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It will be understood, however, that it is not
limited thereto and that various modifications are
possible which are all intended to be encompassed
within the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. In a coffee machine, a combination comprising

means defining a brewing chamber having an
outlet for brewed coffee and being adapted
to receive pods of coffee;

a water reservoir;

means for heating water operatively connected
with said brewing chamber;

first pump means connected with said reservoir
and heating means for forwarding, when energized,
a first quantity of water from said reservoir
to said heating means and a corresponding
quantity of heated water from said heating
means to said brewing chamber;

second pump means also connected with said
reservoir and heating means for forwarding,
when energized, a second larger quantity of
water from said reservoir to said heating
means and a corresponding quantity of heated
water from said heating means to said brew-
ing chamber; and

control means for selectively energizing one
of said first and second pump means.

1 2. A combination as defined in claim 1, one of said
 2 pump means comprising a rotary pump and the other
 3 of said pump means comprising a reciprocating pump.

1 3. A combination as defined in claim 2, said one pump
 2 means being said first pump means, and said reciprocating
 3 pump being operative for forwarding said second quantity
 4 of water in a period of time only insubstantially
 5 longer than the time period required by said rotary
 6 pump to forward said first quantity of water.

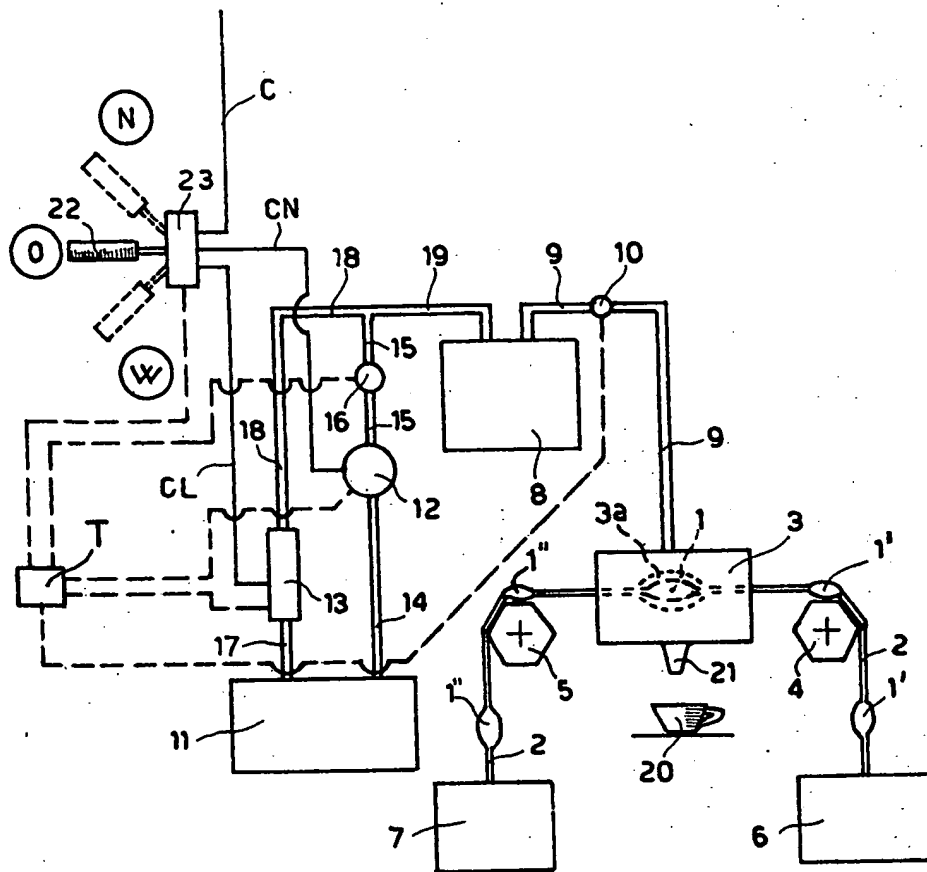
1 4. A combination as defined in claim 3, said reciprocating
 2 pump being dimensioned to forward a second quantity
 3 of water which is approximately triple said first
 4 quantity of water.

1 5. A combination as defined in claim 1; and further
2 comprising conduit means connecting said reservoir
3 and water heating means with said brewing chamber,
4 said first and second pump means being interposed in
5 said conduit means.

1 6. A combination as defined in claim 1; and further
2 comprising timing means operatively connected with
3 said first and second pump means for energizing the
4 same until said first and second quantity of water
5 are supplied to said brewing chamber, respectively.

7. A combination as defined in claim 1; said pump means comprising electric pumps; and further comprising user-operable activating means electrically connected with said pump means and accessible at the outside of said coffee machine for enabling a user to selectively energize one or the other of said first and second pump means.

Ridout & Maybee
101 Richmond St. West
Toronto 1, Canada
Patent Agents of the Applicant



Ridout & Maybee
PATENT AGENTS